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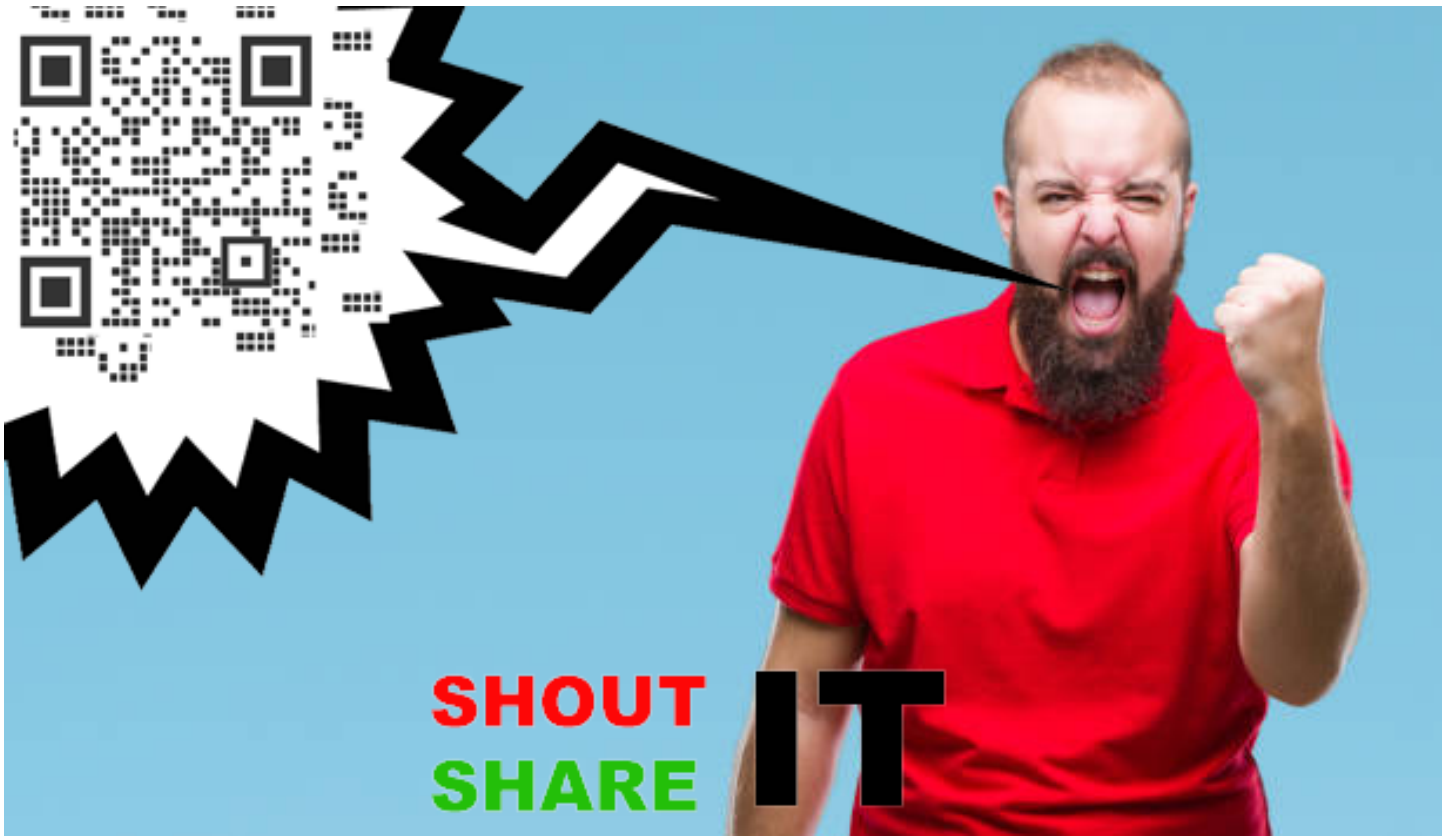
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# White Pine Blister Rust

## Picture Sheet No. 22

(See other side for
life history and control)

*A*, Diseased white pine showing: *a*, dead top; *b*, dead and dying branches; *c*, trunk girdled by canker; *d*, dry pitch streaks and wood where diseased bark was gnawed off by rodents. *B*, Infection spots on pine needles (enlarged 4 times). *C*, Aecial stage on branch showing: *a*, canker with cracked bark; *b*, discolored rim; *c*, pycnial scars; *d*, blisters discharging aeciospores. *D*, Under surface of infected ribes leaf showing: *a*, pustules of uredial stage; *b*, columns of telial stage (both enlarged 3 times). *E*, Ribes bush. *F*, Spore forms: *a*, aeciospore (enlarged 400 times); *b*, urediospore (enlarged 500 times); c, sporidia (enlarged 800 times).

Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U. S. Department of Agriculture

# WHITE PINE BLISTER RUST

(*Cronartium ribicola* Fischer)

## Life History and Damage

Blister rust, a deadly disease of white pines, was unknowingly introduced from Europe on nursery stock about 50 years ago. It is now present in our principal white pine forest regions. Blister rust is caused by a fungus that grows alternately on white or 5-needled pines and currant and gooseberry plants, commonly called ribes, to complete its life cycle.

It reproduces and spreads by different kinds of wind-borne spores. The fungus enters white pine needles, then grows into the bark, where it forms spindle-shaped cankers. A narrow band of yellowish bark marks the edges of the cankers. Inside this band are small, irregular, dark brown pycnial scars. The cankers mature in two or more years after the fungus enters the needles, and then from April to June, white sacs or blisters containing orange-yellow spores, called aeciospores, push through the diseased bark. The blisters rupture, and powderlike spores are scattered by the wind for distances up to 300 or more miles. The broken bark dies, but the fungus continues its growth in the live bark, and new blisters may be produced each spring as long as the fungus lives.

Some of the aeciospores fall on ribes, and infect the leaves. About 2 weeks later small orange-yellow pustules appear on the under surface of infected leaves. These pustules burst, liberating urediospores, which infect ribes leaves on the same and nearby bushes. During summer and fall the fungus develops brownish, hairlike columns of teliospores on the under surface of the diseased leaves. The teliospores germinate and produce spores of another kind, known as sporidia. The sporidia infect white pine needles, thus completing the life cycle. These spores are delicate and short-lived. They are distributed by the wind and usually infect pines only within a few hundred feet of diseased ribes but occasionally may cause infection at greater distances.

Blister rust spreads back and forth between white pines and ribes each year, causing an accumulation of cankers on the pines. The fungus kills by girdling the trunks and branches and sometimes by killing all the twigs. The disease is deceptive, and usually infection on pines is not noticed until damage is apparent. The fungus kills smaller white pines quickly, and prevents natural restocking in forest areas. Larger trees are killed more slowly and usually can be salvaged without complete loss. Diseased trees may be recognized by swollen, spindle-shaped cankers on twigs, branches, and stems. As the cankers girdle affected parts, the needles turn yellow, then brown, and finally drop. Dead and dying trees and branches, broken-off tops, irregular white patches of wood from which the diseased bark has been gnawed by rodents, and large stem cankers with white pitch streaks extending down the trunk are typical signs of blister rust damage. Greatest damage is done to young trees up to 30 years of age. Loss of merchantable timber has occurred in single trees and in small groups of pines scattered throughout forest areas. These losses are larger than most owners realize.

## Control

Blister rust is controlled by destroying ribes bushes growing near white pines. This prevents the spread of the disease to pines. Removal of ribes within 900 feet of pines usually controls the disease, but sometimes removal from a greater distance is necessary. From one to three or more workings are required to eliminate ribes. Scattered bushes may be uprooted by hand, but care must be taken to get out all roots to prevent sprouting. Where they are numerous and difficult to remove, they may be destroyed with chemicals. Management of forests to assure well-stocked stands provides shade that helps to suppress ribes. Ribes-free sites should be selected for planting white pine, and disease-free stock should be used. Infected ornamental pines usually can be saved by cutting out diseased parts, but ribes also must be removed to prevent reinfection.

General control measures being carried out by Federal and State agencies include eradication of the European black currant (*Ribes nigrum* L.), in white pine regions; destruction of ribes in the vicinity of white pine nurseries to insure rust-free planting stock; and enforcement of Federal and State quarantines to prevent replanting of ribes in protected areas and establishment of the fungus in disease-free areas through movement of infected host plants.

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